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POSTER PRESENTATION

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Reproducibility of slice-interleaved T₁ (STONE) mapping sequence

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Background

Slice interleaved T₁ mapping sequence (STONE) allows quantification of native T₁ of the entire ventricle in a single free-breathing scan. Using this sequence, data acquisition for different slices are interleaved, allowing longer recovery time after the inversion pulse, which could result in improved accuracy and precision. However, measurement reproducibility of the STONE sequence has not been previously studied. In this study, we sought to assess native T₁ measurement reproducibility a) *within session*, b) *between sessions* and c) *between days*.

Methods

Eleven healthy subjects (33 ± 16 years, 6 male) underwent non-contrast CMR imaging on 2 different days. Figure 1 shows the study design. Each subject was imaged twice with identical imaging protocol. After image prescription, the subjects were imaged using STONE SSFP with the

following imaging parameters: In-plane resolution = 2.1 × 2.1 mm², slice thickness = 8 mm, slice gap = 4 mm, Field of View = 320 × 320 mm², TR/TE/α = 2.8 msec. / 1.38 msec. / 70°, SENSE-rate = 2, linear ordering, 10 linear ramp-up pulses and acquisition window = 218.8 msec, bandwidth = 1879.7 Hz/pixel. STONE GRE sequence was acquired with following parameters: In-plane resolution = 2 × 2 mm², slice thickness = 8 mm, slice gap = 4 mm, Field of View = 300 × 300 mm², TR/TE/α = 3.9 msec. / 1.94 msec. / 90°, SENSE-rate = 2.5, linear ordering, 10 linear ramp-up pulses and acquisition window = 166.6 msec., bandwidth = 1315.8 Hz/pixel. Imaging was repeated twice for each sequence. Subsequently, subjects were removed from the scanner and repositioned, followed by the same scan protocol. The same imaging protocol was repeated on a second day of scan. All imaging was performed in a 1.5T CMR scanner (Philips Achieva) using a 32-channel cardiac receiver coil array. T₁ maps were created by voxel-wise fitting using a 2-parameter fit model after motion

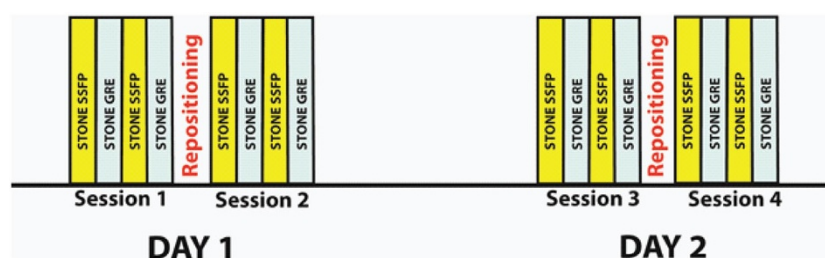


Figure 1 Study protocol to assess within session, between session and between day (test/re-test) variability for native myocardial T₁.

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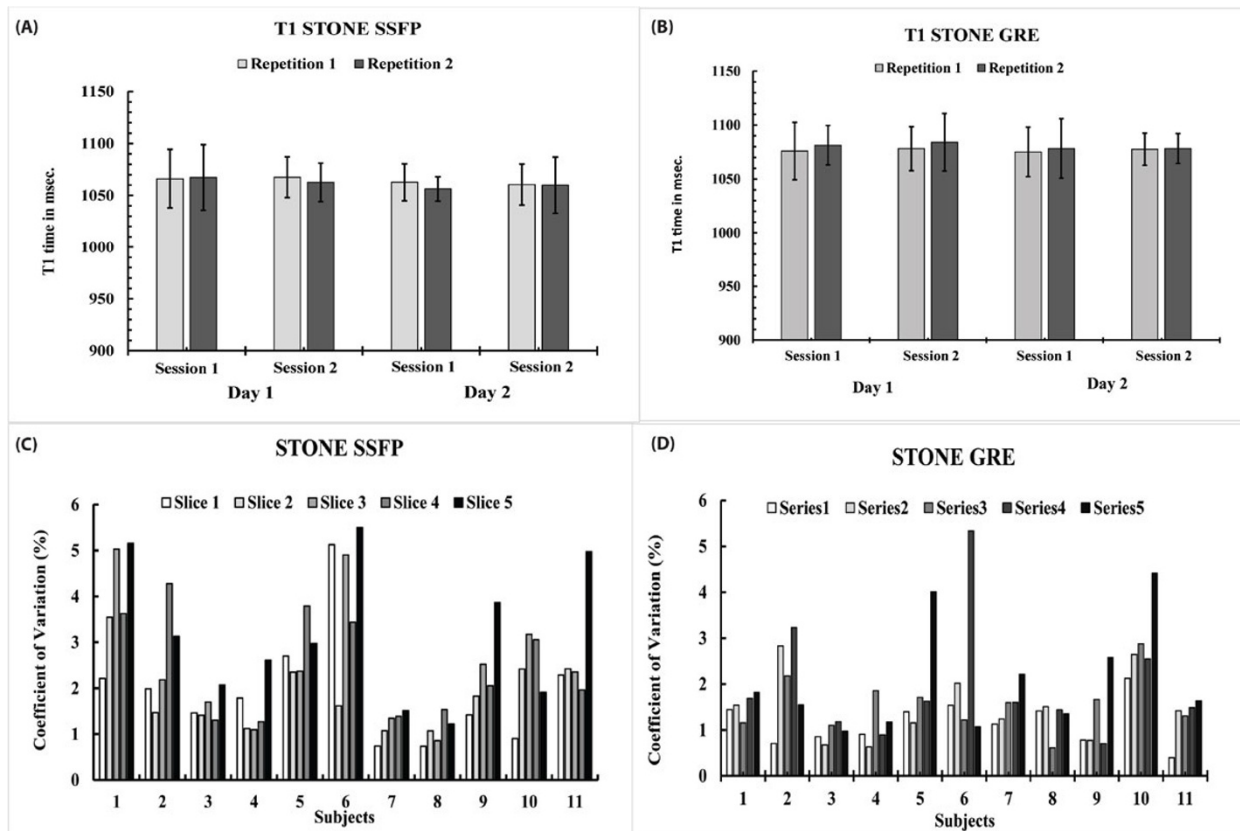


Figure 2 Mean native T₁ per repetition, session and day for STONE and coefficient of variation for different slices and subjects.

correction. The epicardial and endocardial contours in the left ventricle were manually drawn in 5 short axis-slices to calculate global and slice-based myocardial T₁ values. Coefficient of variation analysis for each slice was generated to assess the variability within each session, between the sessions, between different days and for each subject.

Results

Figure 2 shows mean T₁ values for different imaging sessions, averaged over all subjects for STONE-SSFP and STONE-GRE. The CVs for all slices and *subjects* (figure 2) showed low variability for STONE-SSFP ($2.4 \pm 1.3\%$) and for STONE-GRE ($1.65 \pm 0.95\%$). The CVs for all slices and *days* showed a mean of $2.1 \pm 1.45\%$ for STONE SSFP and a mean of $1.5 \pm 1.1\%$ for Stone GRE. The CVs for all slices and *sessions* showed a mean of $1.7 \pm 1.95\%$ for STONE SSFP and a mean of $1.2 \pm 1.3\%$ for STONE GRE.

Conclusions

Native myocardial T₁ measurements by STONE-GRE and STONE-SSFP are very reproducible. These data suggest that STONE-SSFP and STONE-GRE should be

considered for longitudinal studies to assess potential temporal changes in native T₁ values for disease monitoring and/or during therapy.

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